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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,869	08/04/2003	Rick K. Dodge	ITO.0050US (P16247)	5264

7590 01/31/2005  
Timothy N. Trop  
TROP, PRUNER & HU, P.C.  
STE 100  
8554 KATY FWY  
HOUSTON, TX 77024-1841

EXAMINER
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DANG, PHUC T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 01/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/633,869

Applicant(s)

DODGE, RICK K.

Examiner

PHUC T DANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26-30 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 11-18 and 20-25 is/are rejected.
- 7) ☒ Claim(s) 4, 6-10 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 110303.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## **DETAILED ACTION**

### **Oath/Declaration**

1. The oath/declaration filed on August 4, 2003 is acceptable.

### **Information Disclosure Statement**

2. The office acknowledges receipt of the following items from the applicant:

Information Disclosure Statement (IDS) filed on November 3, 2003.

### **Drawings**

3. The drawings are objected to because of the followings:

In Figs. 1-3, the lower electrode 12 is shown, but the upper electrode (pair of the electrodes) does not include as claimed in the invention. Correction is required.

### **Specification**

4. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### **Claim Rejections - 35 USC § 102**

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

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and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, and 23-24 are rejected under 35 U.S.C. 102 (e) as being anticipated by Wicker (US 2004/0113135 A1).

Regarding claims 1 and 23-24, Wicker discloses a method comprising:

forming a phase change memory pore (20, Fig. 1) including a breakdown layer (14, Fig. 1) which positioned between a pair of electrodes (16 and 20, Fig. 1) and increasing the likelihood that the breakdown will occur in one region rather than another region of the layer [page 1 [0012]].

Regarding claim 2, Wicker discloses a step of forming a phase change memory pore by forming an electrode (20, Fig. 1) over a substrate (24, Fig. 1); forming a dielectric layer (18, Fig. 1) with an aperture (20, Fig. 1); and forming a breakdown layer (14, Fig. 1) over the electrode (20, Fig. 1) in the aperture.

Regarding claim 3, Wicker discloses forming a phase change material over the layer and coupling the phase change material between the upper conductive and a lower conductive film [page 1 [0018]].

6. Claim 11 is rejected under 35 U.S.C. 102 (b) as being anticipated by Tsukamoto et al., hereinafter "Tsukamoto" (U.S. Patent No. 4,931,897).

Tsukamoto discloses a memory comprising a breakdown layer (5, Fig. 1D) between a pair of electrodes (3 and 6, Fig. 1E), the breakdown layer (5, Fig. 1D) being ion implanted (6, Fig.

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1B) to increase the likelihood that breakdown will occur in one region rather than another region of the layer [col. 4, lines 37-col. 6, lines 20].

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 5, 12-18 and 20-22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wicker in view of Tsukamoto.

Regarding claim 5, 12, 14-18 and 20-21 and 25, Wicker discloses a method comprising:

a processor-based device (52, Fig. 5);  
a wireless interface (56, Fig. 5) coupled to the processor-based device (52, Fig. 5); and  
a semiconductor memory which is a phase change memory (10, Figs. 1 and 5) coupled to the device, the memory including a pair of electrodes (16 and 20, Fig. 1), a breakdown layer 914, Fig. 1) which is formed by nitride between the pair of electrodes (16 and 20, Fig. 1).

Wicker discloses all the features of the claimed invention as discussed above, but does not disclose the breakdown layer being ion implanted to increase the likelihood that breakdown will occur in one region rather than another region of the layer.

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Tsukamoto, however, discloses the breakdown layer (5, Fig. 1D) being ion implanted (6, Fig. 1B) to increase the likelihood that breakdown will occur in one region rather than another region of the layer [col. 4, lines 37-col. 6, lines 20].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to apply the teaching of Tsukamoto to Wicker discussed above such that the breakdown layer being ion implanted to increase the likelihood that breakdown will occur in one region rather than another region of the layer for a purpose of improving a phase change memory.

Regarding claims 13 and 22, Wicker discloses the phase change material is a chalcogenide [page 1 [0010]].

#### **Allowable Subject Matter**

8. Claims 26-30 would be allowed.

The following is a statement of reason for the indication of allowable subject matter:

Claims 26-30 are considered allowable since the prior art of record and the considered pertinent to the applicant's disclosure does not teach or suggest the claimed invention having a breakdown layer between a pair of electrodes, the breakdown layer having a central region and a peripheral region between the electrodes, such that breakdown is more likely to occur in one of than the other of the regions.

Claims 4, 6-10 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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None of the Prior Art made of record discloses including coupling a lower conductive line to said electrode through a selector as cited in claim 4 and a step including implanting at an angle as cited in claim 6 and a step including forming a relatively centrally located within the pore that is more likely to breakdown as cited in claim 8 and a step including forming a relatively peripherally located region in the pore that is more likely to breakdown as cited in claim 9 and a step including damaging one region of said layer to change the likelihood that a breakdown will occur in that region relative to another region as cited in claim 10 and wherein a central portion of the layer is ion implanted and a peripheral region of the breakdown layer is not ion implanted as cited in claim 19.

Claim 7 is depend on claim 6, then, it also would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### **Conclusion**

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.

11. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Phuc T. Dang

PD

A handwritten signature in black ink, appearing to read 'Dang Phuc T.', written in a cursive style.

Primary Examiner

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